The Effect of Added Nitrogen on First and Second Year Corn After Alfalfa

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Introduction

Soil cores were taken to 90 cm. Corn. N application had 4 treatments and 4 reps. 3 sites were first year corn, and 9 were second year corn. N application has two calculations to find nitrogen application nitrogen that farmers need to apply to the soil. Spring and fall application could be used interchangeably to maximize yield. However, split application is preferable to account for nitrogen losses through leaching and denitrification. An ANOVA test was used to determine if there was a significant difference in nitrogen application and yield. Nitrogen that is not taken up by the plant is lost to the environment.

Objective

1) To determine how much nitrogen is required by first and second year corn to maximize dry matter yield, forage quality and farm profit.
2) To compare the economic optimum nitrogen rate (EONR) to the recommended nitrogen rates to see if these recommendations should be reevaluated.

Materials and Methods

Study Sites: 36 sites have been studied from 2014 to 2017 using a randomized complete block. 27 sites were first year corn, and 9 were second year corn. N application had 4 treatments and 4 reps. 3 soil cores were taken to 90 cm.

Results and Discussion

Figure 1. The average nitrate – N through the soil profile. First and second year data were pooled and analyzed separately.

Figure 2. The average total nitrogen (TN) through the soil profile. First and second year data were pooled and analyzed separately.

Figure 3. The average dry matter yield. First and second year data were pooled and analyzed separately.

Conclusions

1) After alfalfa, first year corn fields had, on average, 156.9 kg nitrate ha⁻¹ and 8,022 kg TN ha⁻¹ in the top 90 cm. Second year fields had 145.3 kg nitrate ha⁻¹ and 7,770 kg TN ha⁻¹ to the same depth. This potential nitrogen credit caused first and second year corn to show very little response to added nitrogen. However, if irrigation is improperly managed the nitrogen responses could be much greater, see site 16.

2) The comparison between the recommended nitrogen application rates and the EONR suggests that our current recommendations, for both first and second year corn, may be too high.

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